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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/720,372	03/09/2001	Kenji Kubomura	KUBOMURA-1	2532

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EXAMINER	
PIERCE, JEREMY R	

ART UNIT	PAPER NUMBER
1771	

DATE MAILED: 02/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/720,372	KUBOMURA ET AL.	
	Examiner	Art Unit	
	Jeremy R. Pierce	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 December 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,7,21-23 and 28-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7,21-23 and 28-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on December 1, 2004 has been entered. Claims 1 and 4 have been amended. Claims 1-4, 7, 21-23, and 28-30 are currently pending.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-4, 7, 21-23, and 28-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1 and 4 recite "said matrix resin is used to control the coefficient of linear expansion of the composite material such that said coefficient approaches substantially zero." However, the specification does not disclose the matrix resin is used to control the coefficient of linear expansion of the composite material. Although a thermal expansion ratio of 60 ppm/°C is given for the epoxy resin, there is no disclosure as to how this relates to the coefficient of linear expansion of the composite material.

Claims 1 and 4 recite "all of the reinforcing fibers have a negative coefficient of linear expansion." No support for this limitation is found in the specification.

4. Claims 1-4, 7, 21-23, and 28-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 1 and 4 recite "said matrix resin is used to control the coefficient of linear expansion of the composite material such that said coefficient approaches substantially zero." There is no teaching in the specification of the amount of resin required to perform such a function on any particular group of fibers. Applicant provides several Tables in the specification that show the effect on the coefficient of linear expansion when fibers having a negative coefficient are mixed with fibers having a positive coefficient. But there is no teaching in the specification describing how the resin is combined with these fibers to create a composite material having a coefficient of linear expansion of substantially zero. How is the resin applied to the fibers? How much resin is used? Applicant claims the novelty of the present invention lies in using the resin matrix to control the coefficient of linear expansion, however, a person having ordinary skill in the art is not taught how to incorporate the matrix resin so that it controls the coefficient of linear expansion.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyadera et al. (U.S. Patent No. 4,446,191) in view of Nelson (U.S. Patent No. 3,877,034).

Miyadera et al. teach a heat resistant laminate with a low expansion coefficient (column 1, lines 5-7). The laminate is made from composite fabrics comprising 30-95% by weight of aromatic polyamide and 5-70% by weight of glass fibers (column 1, lines 41-47). The glass fibers have a positive coefficient of thermal expansion, but the aromatic polyamide fibers control the thermal expansion of the composite because they have a negative coefficient of thermal expansion. The composite fabric may be woven (column 1, line 64). The weave may be made from alternating one by one aromatic polyamide fiber and glass fiber (column 2, lines 4-7). Also, the weave may be formed from twisting fibers of aromatic polyamide and glass together into a yarn, then weaving the yarn (column 2, lines 8-27). The composite fabrics are then impregnated with a resin (column 3, lines 31-36), and optionally made into a prepreg by incorporating hardener with the resin (column 3, lines 42-45). Miyadera et al. do not specifically teach the epoxy resin is used to control the coefficient of linear expansion to substantially zero. Nelson teaches that zero coefficient of linear expansion may be achieved by balancing negative coefficient fibers with a relative amount of epoxy resin (column 10,

lines 26-30). It would have been obvious to a person having ordinary skill in the art at the time of the invention to factor in the epoxy resin of as a consideration in creating coefficient of linear expansion approaching zero, as taught by Nelson, in order to produce a laminate material with a coefficient approaching zero, as desired by Miyadera et al. (column 1, lines 26-27).

7. Claims 1, 2, 4, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kashima et al. (U.S. Patent No. 5,462,791) in view of Nelson.

Kashima et al. disclose a laminate of fabrics composed of glass fibers and/or polyethylene fibers (column 7, lines 14-64). Each fabric layer may be composed of the same material, alternating the positive coefficient fibers with the negative coefficient fibers, or each fabric may be composed of two different fibers. The fabric layers are then impregnated with an epoxy resin (column 4, lines 27-43). Kashima et al. teach canceling out the coefficients of thermal expansion to equal zero (column 6, lines 4-6), but Kashima et al. do not specifically teach the epoxy resin is used to control the coefficient of linear expansion to substantially zero. Nelson teaches that zero coefficient of linear expansion may be achieved by balancing negative coefficient fibers with a relative amount of epoxy resin (column 10, lines 26-30). It would have been obvious to a person having ordinary skill in the art at the time of the invention to factor in the epoxy resin as a consideration in creating coefficient of linear expansion approaching zero, as taught by Nelson, in order to produce a laminate material with a coefficient approaching zero, as desired by Kashima et al.

8. Claims 1, 2, 4, 21, 23, 28, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leibowitz (U.S. Patent No. 4,689,110) in view of Nelson.

Leibowitz discloses a laminate with alternating layers of PTFE material and graphite impregnated with an epoxy resin (column 2, lines 30-48). The high coefficient of expansion of the PTFE is controlled by the graphite layers (column 4, lines 40-65). Kashima et al. disclose a laminate of fabrics composed of glass fibers and/or polyethylene fibers (column 7, lines 14-64). Each fabric layer may be composed of the same material, alternating the positive coefficient fibers with the negative coefficient fibers, or each fabric may be composed of two different fibers. The fabric layers are then impregnated with an epoxy resin. Leibowitz discloses the epoxy resin balances out the graphite layers to a coefficient of linear expansion close to zero (column 4, lines 46-48), but Leibowitz does not specifically teach the epoxy resin is used to control the coefficient of linear expansion of the laminate to substantially zero. Nelson teaches that zero coefficient of linear expansion may be achieved by balancing negative coefficient fibers with a relative amount of epoxy resin (column 10, lines 26-30). It would have been obvious to a person having ordinary skill in the art at the time of the invention to factor in the epoxy resin as a consideration in creating coefficient of linear expansion approaching zero, as taught by Nelson, in order to produce a laminate material with a coefficient approaching zero, as desired by Leibowitz.

9. Claims 3, 7, 22, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leibowitz in view Nelson as set forth above in section 9, and further in view of Yuan (U.S. Patent No. 4,020,209).

Leibowitz does not disclose the fabrics to be woven in a triaxial configuration. Yuan teaches that triaxial fabric can be used to create a range of designs and parameters of strength, density, weight, and porosity (column 2, lines 37-61) and that triaxial fabric is used in preparing circuit boards (column 4, lines 6-7). It would have been obvious to one having ordinary skill in the art to use a triaxial weave in the fabrics of Leibowitz in order to create the fabrics with a wide range of designs and parameters, as taught by Yuan.

10. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyadera et al. in view of Nelson as set forth above in section 7, and further in view of Leibowitz.

Miyadera et al. do not teach using carbon or polyparaphenylene benzo oxazale fibers as the fibers with a negative coefficient of expansion. Leibowitz teaches that the use of graphite fibers greatly strengthens the circuit board structure (column 5, lines 11-13). It would have been obvious to one having ordinary skill in the art to use graphite fibers as the fibers with a negative coefficient of expansion in the laminate of Miyadera et al. in order to increase the strength of the laminate, as taught by Leibowitz.

Response to Arguments

11. Applicant's arguments filed December 1, 2004 have been fully considered but they are not persuasive.

12. Applicant traverses the 35 USC 112 rejections with respect to the limitation that the matrix resin is used to control the coefficient of linear expansion of the composite

material such that said coefficient approaches substantially zero. While Applicant quotes various sections of the specification, none of these sections supports the claimed limitation. The specification does not teach that the matrix resin is used to control the coefficient so that the coefficient approaches zero, so the limitation is new matter. The limitation is also non-enabled because there is no disclosure on the effect that epoxy resin has on the coefficient of linear expansion of the composite material. Applicant later argues that a person of ordinary skill in the art recognizes that zero is obtained when one combines a negative number with a corresponding positive number. But the specification does not teach one skilled in the art how to control the coefficient of thermal expansion with epoxy resin. If a person of ordinary skill in the art already knows that a positive coefficient must be combined with a negative coefficient to achieve zero, then it is unclear what the patentable subject matter of the present Application is, since the specification does not teach or suggest anything more than what is already known.

13. Applicant argues that the new claim limitation reciting the reinforcing fibers can all have a negative coefficient of linear expansion is supported by the specification at page 9, which states, "In these examples, the fiber bundles have the same coefficient of linear expansion..." However, this is insufficient to support a claim limitation that all of the reinforcing fibers in a composite material have a negative coefficient. This example does not teach that the composite material has coefficient that approaches substantially zero, so there is no support that the all fibers must have a negative coefficient.

14. Applicant argues that neither Miyadera et al. nor Nelson disclose that the fibers all have the same coefficient of linear expansion. However, this limitation is claimed in the alternative to having at least one kind of reinforcing fibers having a negative coefficient of linear expansion. Additionally, Miyadera et al. teach combination yarns, which would have the same coefficient (column 2, lines 7-26).

15. Applicant argues Miyadera et al. only discloses that the laminate has a low expansion coefficient, but there is no disclosure that the coefficient approaches zero. However, if the goal of Miyadera et al. is to achieve a low coefficient, then this seems to match perfectly with the claimed limitation of approaching substantially zero. Applicant argues Nelson only discloses using one type of fiber, not two or more kinds of reinforcing fibers. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Miyadera et al. provide two types of fibers mixed with the claimed resin. Nelson teaches that the resin may be used to achieve a coefficient of zero.

16. Applicant argues that Kashima et al. specifically disclose that thermal contraction of fiber-reinforced plastic can be controlled using reinforcing fiber materials having reciprocal thermal expansion properties. It is true that Kashima et al. disclose using reinforcing fibers having reciprocal thermal expansion properties (column 3, lines 49-55). However, the reciprocity is achieved using fibers having a positive coefficient

mixed with fibers having a negative coefficient (column 4, lines 12-26). This is the same as Applicant claims.

17. Applicant argues that there is nothing in Nelson that would one skilled in the art to factor in the epoxy resin in obtaining a composite with a coefficient of linear expansion approaching zero. However, Nelson teaches that zero coefficient of linear expansion may be achieved by balancing negative coefficient fibers with a relative amount of epoxy resin (column 10, lines 26-30). Applicant asserts that Nelson does not suggest using a plurality of types of fibers. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

18. Applicant argues that there is no motivation to substitute epoxy of Nelson for the resin used in Leibowitz. However, Leibowitz teaches the use of epoxy resin by itself (column 4, lines 46-48).

19. Applicant argues that Yuan is silent with respect to coefficient of thermal expansion. However, the Yuan reference was not used to show this feature in the rejection.

20. Applicant argues that there is nothing in Leibowitz that would one to use the Miyadera et al. fabric comprising 30-95% aromatic polyamide fiber and 5-70% glass fiber, as there is no suggestion that the Miyadera et al. composite has a coefficient of linear expansion approaching zero. However, Miyadera et al. suggest the composite

approaches zero because Miyadera et al. teach the composite to have a low coefficient. Substantially approaching zero is the target to achieve a low coefficient.

Conclusion

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeremy R. Pierce whose telephone number is (571) 272-1479. The examiner can normally be reached on Monday-Thursday 7-4:30 and alternate Fridays 7-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on (571) 272-1478. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JRP
JRP
February 10, 2005

ELIZABETH M. COLE
PRIMARY EXAMINER